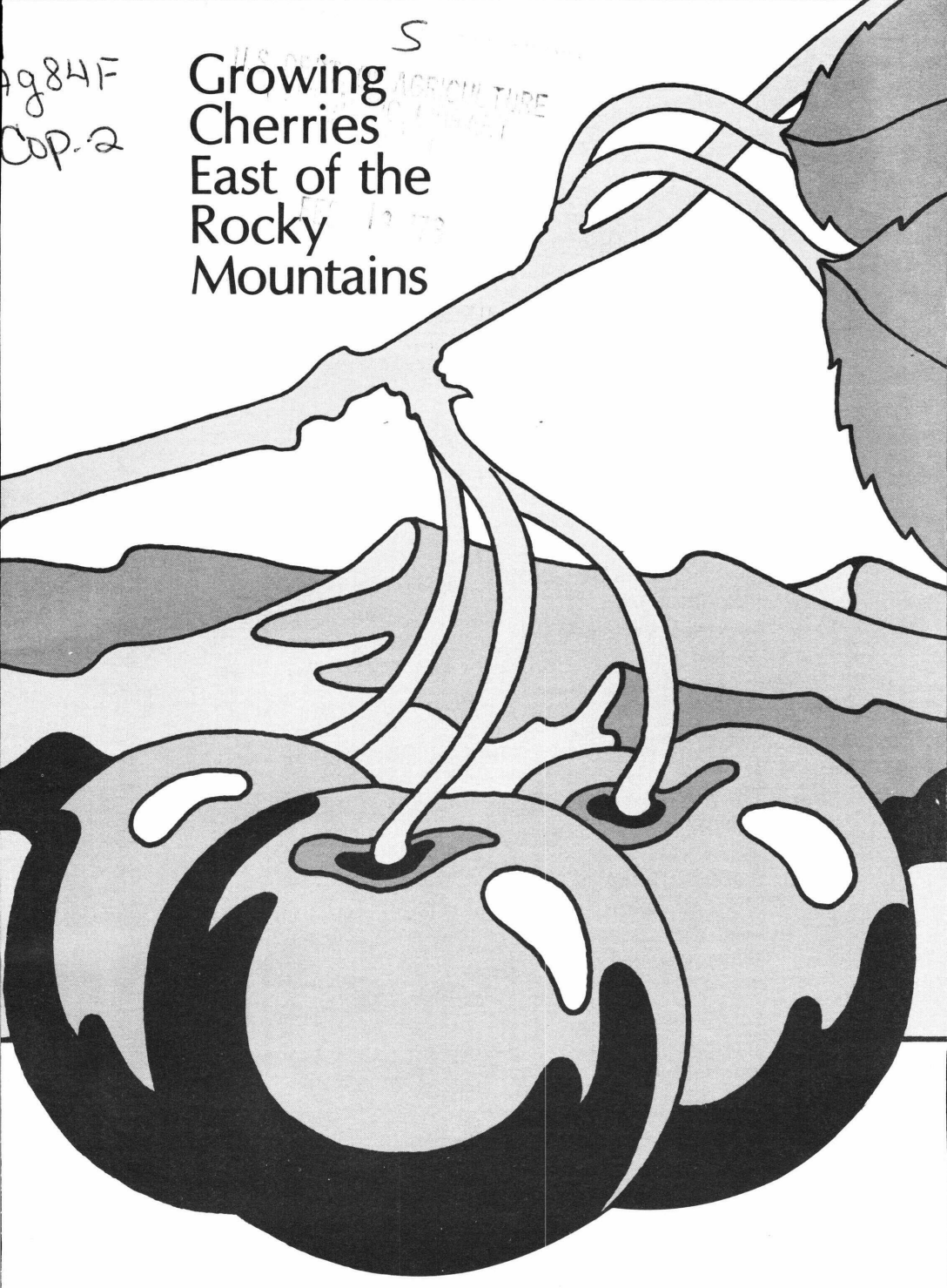
Growing Cherries East of the Rocky Mountains



UNITED STATES DEPARTMENT OF AGRICULTURE

FARMERS' BULLETIN NUMBER 2185

PREPARED BY AGRICULTURAL RESEARCH SERVICE

CONTENTS

Washington, D.C. Revised November 1977

GROWING CHERRIES EAST OF THE ROCKY MOUNTAINS[1]

DISTRIBUTION OF TREES

Approximately 11 million cherry trees of bearing age grow throughout the United States. They are distributed in every State, but almost three-fourths of them grow in Michigan, New York, Wisconsin, and Pennsylvania (fig. 1).

Sour cherries predominate: In all States there are about 7 million sour-cherry trees, and 4 million sweet-cherry trees.

Climate, usually temperature, is the most important influence in the geographic distribution of cherry trees. Generally the trees do not thrive where summers are long and hot, or where winter temperatures are high for short periods. Chiefly because of this, they are grown only to a slight extent in the South; there they thrive best at higher altitudes.

Winter injury to trunks of cherry trees is serious in some central and southern parts of the country (fig. 2). Sour-cherry trees are usually less hardy than apple varieties such as McIntosh and Northern Spy, commonly grown in the northern commercial apple-producing areas. Sometimes the trunks and crotches of the cherry trees are injured by low winter temperatures in the northern cherry-growing areas (fig. 3). Also, sour-cherry blossoms are very susceptible to injury by low temperatures in the spring; often they are injured more than the blossoms of peaches in the same areas.

The most important commercial sour-cherry orchards are located in western New York, in western Michigan, in northern Ohio, in the Arkansas River Valley in Colorado, central Utah, in Door County, Wis., and in southern Pennsylvania. Quantities of cherries are produced in other States and sections, but usually the individual orchards are small and do not represent important community interests. Sour cherries often produce well in the central and

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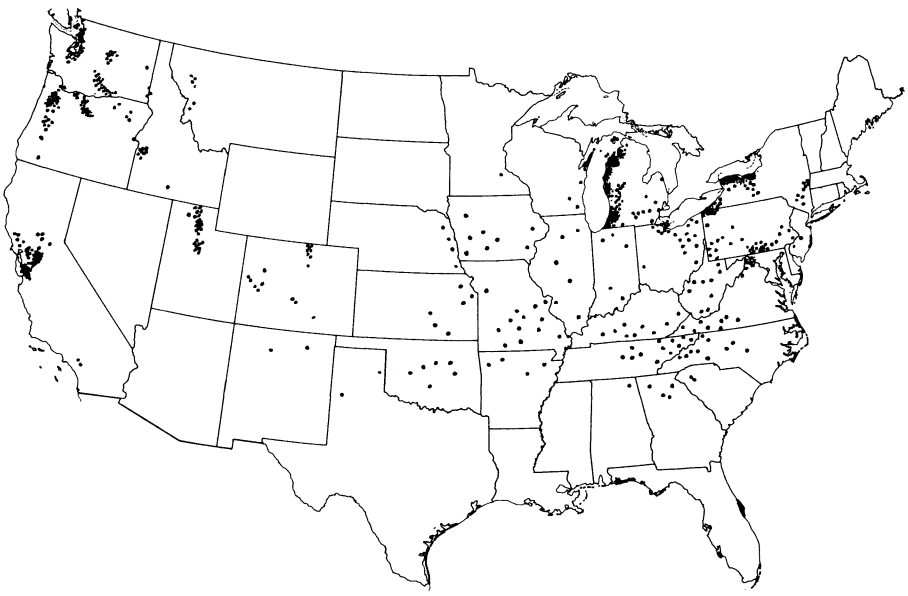

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Figure 1.—Map of United States, showing distribution of cherry trees in 1960. Most of those growing along the Pacific coast are sweet cherries. Note the wide distribution of trees and the concentration of plantings near the Great Lakes.

southern Great Plains region, where more tender fruits usually fail.

The leading varieties of sweet cherries are less hardy than the best-known sour varieties. Their endurance of cold is similar to that of the peach. Sweet varieties are susceptible not only to wood and bud injury during winter but also to frost damage to blossoms in early spring.

The most important sweet-cherry producing sections are in the Pacific Coast States, where the sour cherry is not grown extensively. East of the Rocky Mountains, commercial production of sweet cherries is confined largely to western New York, and to western Michigan. In the two areas, the climate is considerably moderated by the Great Lakes. Sweet-cherry trees are widely distributed in a large part of the country, but their number is relatively small except in the sections mentioned.

SELECTING ORCHARD SITES

The orchard site is the area of land actually occupied by the trees. Selecting a site for a cherry orchard requires the same general considerations that apply in selecting a site for an apple or peach orchard. The most important considerations are soil and local climatic conditions.

Soil

Cherry trees thrive on a wide range of soil types, provided the soils are

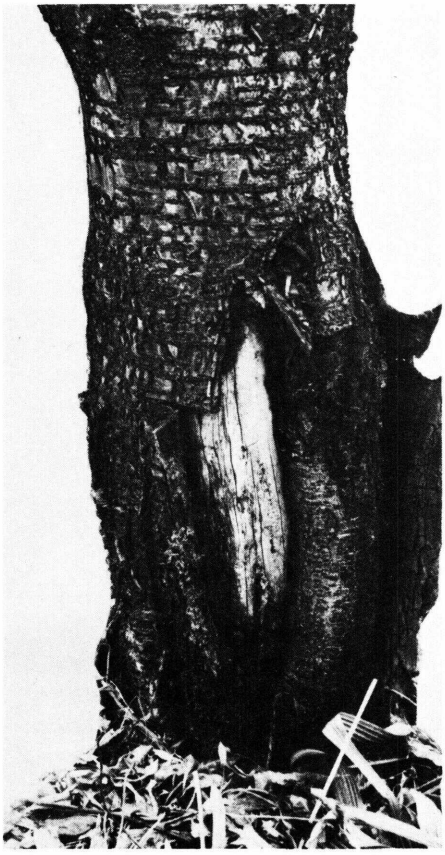

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Figure 2.—Trunk of Montmorency cherry, showing winter injury. This type of injury is often caused by rapid changes in temperature. The injury to this tree occurred several years before the photograph was made, and considerable healing had taken place, as indicated by new bark along the right side of the wound.

well drained. Perhaps no fruit tree is more sensitive to the ill effects of a poorly drained soil than the cherry (figs. 4 and 5). In many important cherry-growing sections, the prevailing soils are rather light—sandy loams and other light, sandy soils—and usually are underlain by a clay-type subsoil. Such soils occur in districts bordering the Great Lakes, where the most important commercial cherry areas east of the Rocky Mountains are located. However, the industry doubtless has developed in these districts because of climatic conditions that are induced by large bodies of water, rather than because of the existence there of any particular soil type.

Many of the better orchards in western New York are on Dunkirk clay loam, which is fairly heavy but well drained. Because the heavier, clay types often are extremely retentive of moisture or are insufficiently drained for good results, the comparatively light soils are preferred for cherries.

For success with sweet cherries, the lighter, warmer types of soil usually are regarded as essential. Soils that are droughty, and that dry out excessively, are unsatisfactory for either type of cherry. Moderately productive soils give better results than those having either extreme in fertility.

Temperature

Local temperature conditions should be given consideration. Cherries blossom comparatively early; usually the sweet varieties blossom earlier than the sour. Sites that are subject to spring frosts during the blossoming period should be avoided. Because cold air settles to lower levels, orchards occupying sites somewhat higher than the surrounding areas are usually less liable to frost injury than are those having comparatively low elevation. Also, the soil on higher levels is likely to be better drained.

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Figure 3.—Sweet-cherry tree, showing winter injury to crotch and trunk. This tree grew in New York, and the injury occurred after the late growing season that preceded a freeze in early December.

PROPAGATION AND CHOICE OF STOCKS

The details of propagating cherry trees are of little direct importance to the average grower, who usually finds it to his advantage to buy trees from a reputable nurseryman. Trees are propagated by budding on seedling stocks in the nursery row; 1- or 2-year-old trees are commonly sold for planting. Since virus diseases that reduce fruit production can be car-

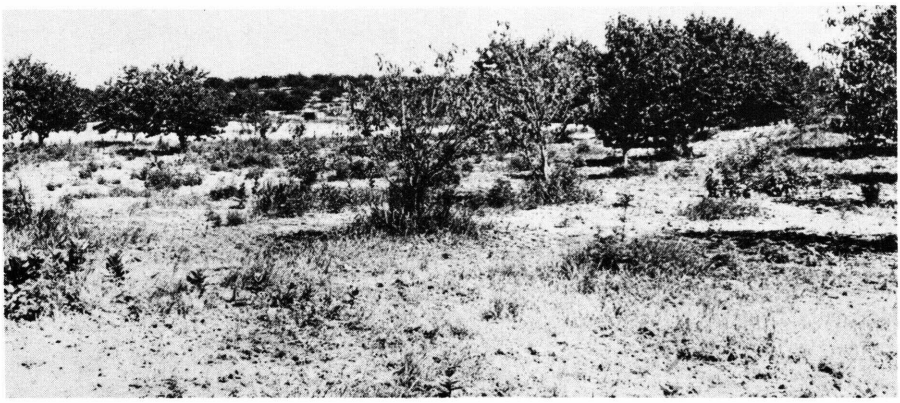

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Figure 4.—Young sweet-cherry trees (foreground and center) that grew poorly because they were planted on poorly drained soil. Trees on higher ground and better drained soil (right and left) made good growth.

ried in the buds, it is essential that nurserymen use budwood only from trees that are free of such diseases.

Two kinds of rootstock are in general use—the mahaleb and the mazzard.

The mahaleb is used much more extensively than the mazzard. Usually it is satisfactory for the sour varieties, and is more productive when these varieties are grown in good soil. The mahaleb stock is also commonly used for sweet cherries, and tends to produce a smaller, more spreading tree; but there is evidence that sweet cherries often are more vigorous and longer lived when grown on mazzard stock. Certain sweet cherry varieties are also incompatible with mahaleb rootstocks, so mazzard is generally preferred.

Trees on Mahaleb Rootstock seem more spreading than those on mazzard in the early bearing years, probably because those on mahaleb usually grow more slowly and bear fruit when they are younger. Mazzard rootstock is more desirable for poor soils.

Some growers prefer the mazzard as a stock for sour as well as sweet cherries. Other growers, however, maintain that trees propagated on mahaleb stock are preferable because they come into bearing earlier and produce heavier crops while young. These differences are often due to different soil types.

SELECTING AND HANDLING NURSERY-GROWN TREES

For sour cherries, 1- or 2-year old nursery trees may be used. Medium-sized trees, 4 to 5 feet high and 1/2 to 3/4 of an inch in diameter, seem preferable, but smaller trees are often satisfactory (fig. 6).

For sweet varieties, many growers are selecting 1-year-old trees. These

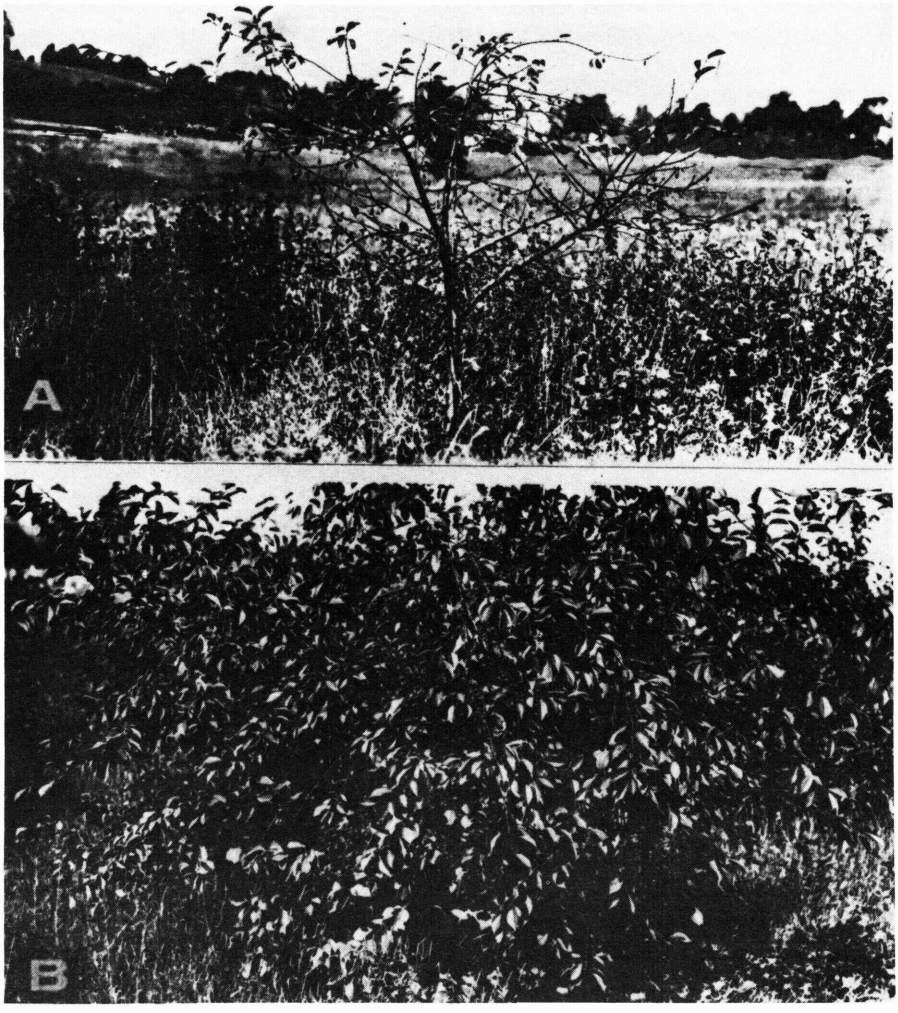

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Figure 5.—English Morello trees 6 years old, showing effect of soil drainage: A, On poorly drained soil; B, on well-drained soil. These trees were within 2 rods of each other, and the camera was at the same distance from each.

trees should be medium size—4 to 5 feet high, and 1/2 to 3/4 of an inch in diameter.

The trees should be unpacked immediately after delivery, and every precaution should be taken to prevent the roots from becoming dry. The trees should be heeled in (fig. 7), unless their number is so limited that immediate planting is possible and the time for doing it is at hand.

A thoroughly drained place where the soil is mellow and deep should be used for heeling in the trees. A trench is made sufficiently wide and deep to receive the roots, and the trees are laid in at an angle. Moist soil is then

worked among the roots to fill all the spaces between them. If a large number of trees are to be heeled in, they usually are placed in closely adjacent rows. When this is done, the roots in one row may be covered with the soil that is removed in opening the adjacent trench. Trees that are tied in bundles when received must be separated before they are heeled in. If this is not done, it is difficult to work the soil among the roots sufficiently to prevent them from drying.

It is best that cherry trees be planted as soon as possible after they are dug in the nursery. Much loss of young orchard trees could be prevented if this were done. Spring planting is usually recommended. Loose soil from fall plantings is more likely to freeze and cause root damage.

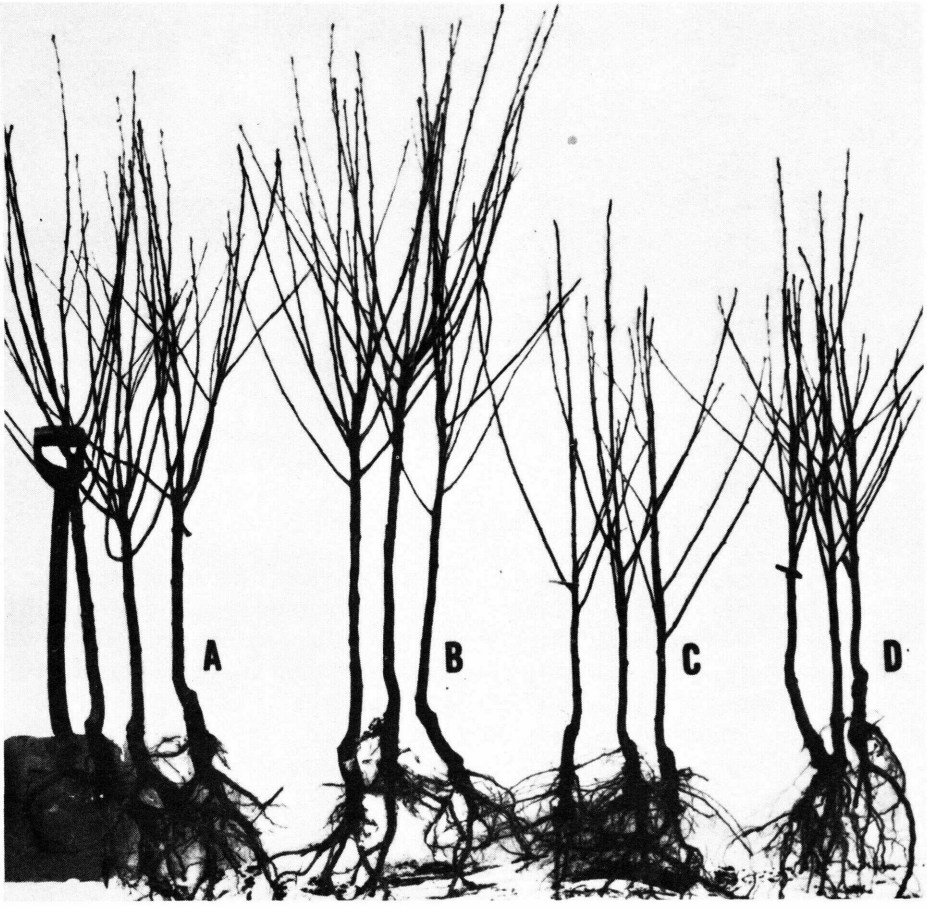

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Figure 6.—Sour-cherry trees representing different grades of nursery stocks, as follows: A, 2-year-old Montmorency on mazzard mazzard stock, 3/4 inch up in diameter, 5 to 7 feet high; B, same as A except on mahaleb stock; C, 1-year-old Montmorency on mazzard stock, 5/8 to 11/16 inch in diameter, 3 to 4 feet high; D, 1-year-old Montmorency on mahaleb stock, 5/8 to 11/16 inch in diameter, 3 to 4 feet high.

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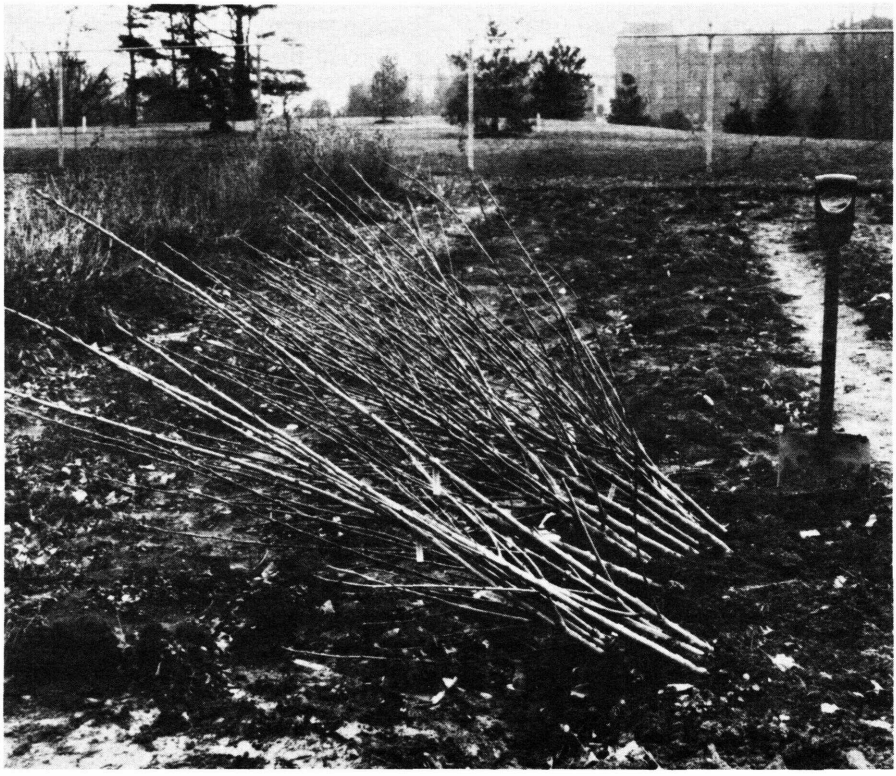

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Figure 7.—Cherry trees heeled in.

PLANTING THE TREES

In areas where winters are extremely severe, spring planting is advisable. In the middle latitudes and where winters are comparatively mild, fall planting usually is possible.

It is very important to keep the trees in a completely dormant condition until they are set out. The reason for this is that the buds of cherry trees swell and start growth very early; if this begins to any considerable extent before the trees are planted, a high percentage of failures is likely to result.

Soil for cherry planting should be prepared according to the method found necessary for other trees and crops of a similar nature. This will vary with the location and soil type.

The planting distances for cherry trees depends upon the planned harvest method. For hand harvesting, permanent trees may be planted 20 to 24 feet apart depending on soil fertility, varietal characteristics of the trees, and preferences of the individual growers. Filler trees are often planted and grown to 12 to 15 years and then removed leaving the permanent trees at the distances above.

Most commercial orchards will be harvested mechanically and thus

machine size and type are a prime consideration in present planting distances (fig. 8). The general practice is to plant permanent trees in the row 18 to 22 feet apart with rows 22 to 24 feet apart which will accommodate most trunk or limb shakers of the rollout or self-propelled types. Often filler trees are interplanted and grown 12 to 15 years before removal in order to increase production per acre the first few years of the orchard's life. Herbicides and trickle irrigation are very helpful as cultural tools in this regard. In such instances, initial tree distances are 11 x 22 or 11 x 24 feet with permanent spacing eventually 22 x 22 feet or 22 x 24 feet (fig. 9). New summer hedging techniques may allow for permanent plantings of 12 x 20 feet or 12 x 18 feet in the near future.

Where mechanical harvesting is to be practiced, contours and terraces are not suggested, but rather soil conservation by sod culture in the middle of the row combined with herbicides under the trees.

Soil and moisture conservation are important for the best production. Usually the extra time required to plan and lay out a good conservation system is well spent.

The details of planting do not differ from those usually followed with apples, peaches, or other fruit trees commonly planted in sections where cherries are grown.

When a tree is being prepared for planting, all mutilated or injured

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Figure 8.—Montmorency cherry orchard about 21 years old, New York. The trees are 14 feet apart each way and tall. As a result of the trees being planted too close together, the branches are long and slender.

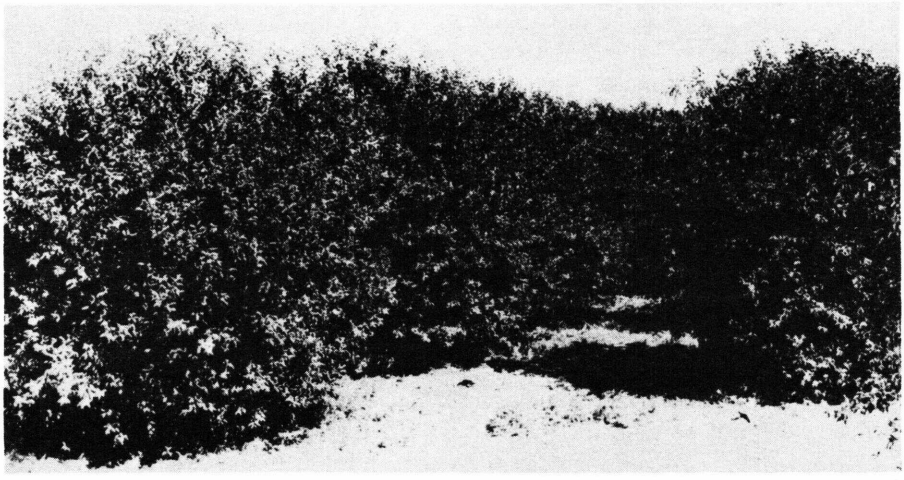

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Figure 9.—Well-spaced trees in a Montmorency cherry orchard. The semipermanent trees were removed when 12 years old.

parts of the roots should be removed; long, slender roots, if they occur, should be cut to match the length of the main roots.

Every precaution should be taken to prevent the roots from becoming dry. The tree roots will be injured if they are unduly exposed to cold or to drying out during the period between trimming and planting. Many poor stands of cherry trees have resulted from allowing the roots to be exposed just before planting.

In filling the hole after a tree has been put into position and alined, only pulverized topsoil should be used around the roots. Care should be taken to work the soil in closely; moving the tree up and down very slightly as the hole is being filled will help settle the soil among the roots. As the filling progresses, the soil should be firmly tamped about the roots; when the operation is completed, the hole should be filled to the surface. If water is available, the hole should be filled with water when it is about two-thirds filled with soil then completely filled with soil several hours later.

TILLAGE AND MAINTENANCE OF SOIL FERTILITY

Most cherry orchards are grown with sod between the rows. Kentucky Bluegrass sometimes combined with perennial ryegrass or fescues are most common in Michigan. Herbicides are used to control weeds and grasses under the trees.

Paraquat alone is used as herbicide the first year and either glyphosate or paraquat alone from year two *until bearing age*. After the trees are well established, simazine may be applied annually with the paraquat for effective weed and grass control in the area under the trees. Generally in older orchards, an area 10 to 12 feet

wide between the rows is maintained in sod, and the grass and weeds are controlled in about a 10-foot wide area under the trees. Usually this is done in solid strips for ease of mowing rather than square patches under each tree.

Such sod-herbicide combinations allow for clean harvesting and ease of moving harvesting equipment, and at the same time, controls soil erosion and prevents competition for moisture under the trees.

The older system of clean cultivation is still practiced by some growers, especially if they still harvest the fruit by hand. Where clean cultivation is practiced, winter cover crops of rye or other suitable grass should be used to prevent soil erosion.

Low volume irrigation variously known as the drip or trickle system is gaining wide acceptance among cherry growers. It is a means of efficiently applying needed moisture during periods of dry weather. This type of irrigation is especially important in growing young trees, and also has obvious advantages in bearing orchards.

The fertilization procedure for cherries is similar to that necessary for other orchard trees; it varies somewhat with the soil. Cherries usually respond well to nitrogenous fertilizers such as sodium nitrate, ammonium sulfate, and ammonium nitrate. Because of differences in the soil, no definite amount to apply can be stated. As a general guide, one-half pound of sodium nitrate for each year of the tree's age may be used. Thus, a 6-year-old tree would be given 3 pounds of sodium nitrate, or 1 1/2 pounds of ammonium nitrate, since the latter contains twice as much actual nitrogen as the sodium nitrate. Cherries respond well to potassium and soil levels should be maintained at adequate levels.

The fertilizer should be spread uniformly under and around the trees to just beyond the drop of the branches. Nitrogen fertilizer may be applied either in fall or early spring. Usually it is necessary to apply more fertilizer to trees grown in sod than to those that are clean cultivated.

A young orchard may endure an interplanted crop without appreciable ill effect, but the crop will be of no benefit to the trees unless the orchard is given better tillage because of it. Beans, peas, tomatoes, and other vegetables of like cultural requirements are the least objectionable. Crops that require late-summer cultivation should not be used in the Northern States where winter injury of cherry is common because of immaturity of the wood.

The planting of an annual crop in an orchard is a system of double cropping in which the more important crop is the cherry. The tops require only a small part of space aboveground, but the roots occupy a large part of the soil much earlier in their lives than is commonly supposed.

PRUNING

Trees of the sour-cherry varieties tend to spread in growth and those of the sweet varieties are more upright. These different growth habits should be considered in pruning and training the trees. The modified-leader system

is preferable for all types of cherries; but the sweet varieties tend naturally toward a central-leader tree, and it is best not to try to change them much.

Growth Regulation

Two growth regulator materials are commonly used by cherry growers on both sweet and sour cherries.

Alar: The compound is applied 2 weeks after full bloom and results in 7 to 10 days earlier ripening, more uniformly colored fruit, and generally some added firmness in sour cherry. Use on sweet cherries is generally restricted to those to be canned or for fresh marketing since brined fruit should not be highly colored.

Ethephon: This compound is used as a harvest aid in both sweet and sour cherries. It is applied a few days before anticipated harvest and acts to loosen the fruit from the stem. This material is especially important in sweet cherries for brining purposes since they are harvested at an immature stage before color develops. Ethephon loosens the stem and allows for much easier mechanical harvesting.

Sour-Cherry Trees

One- and 2-year-old nursery trees will be branched when received. These branches should be removed, leaving only the central leader. Nursery grown branches generally have narrow crotch angles with poor attachment to the trunk. By removing the nursery grown branches or "whipping" the tree, new branches will grow from buds the first season in the field. Within the next two growing seasons, about four main or scaffold limbs should be chosen. The lowest limb should be 24 to 30 inches off the ground and there should be a minimum of 8 inches between limbs. Ideally, the four limbs would be evenly spaced around the tree at different levels so that no limb is directly over another (fig. 10). If they are allowed to develop at the same height, a weak tree is likely to develop (fig. 11 and 12).

For scaffold limbs, only branches with the widest angles should be retained. The more vigorous branches should be selected, and should be cut back to about the length of weaker ones, so that all may develop to approximately equal length. The main stem, or trunk, is not cut back at planting time; it should be left

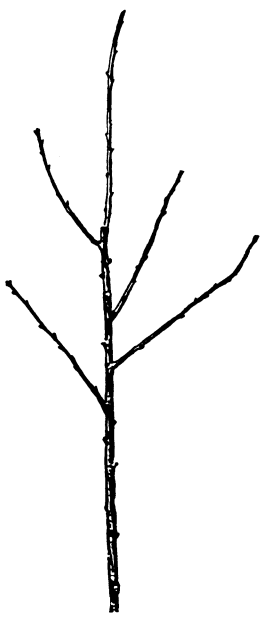

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Figure 10.—Montmorency tree grown 2 years in the nursery and about 4 feet high, pruned properly for setting in the field. Note that the original leader was cut back about 1 year in the nursery but that the lateral branch selected as a leader was not cut back.

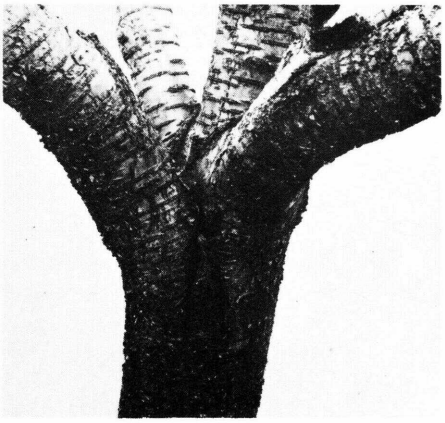

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Figure 11.—Montmorency cherry tree that has no leader, and has all scaffold limbs arising at the same height. The limb at the left is very weak at the crotch and is likely to break and leave a large wound on the trunk.

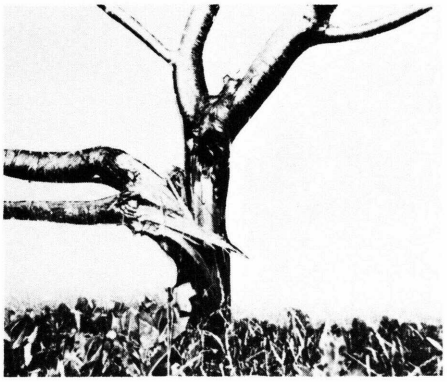

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Figure 12.—Eight-year-old cherry tree, showing type of scaffold-limb breakage common on cherry trees on which several limbs are allowed to develop at the same height.

higher than any of the scaffold branches (figs. 10 and 13).

The pruning during the first 4 or 5 years is mainly to train the young trees so as to obtain maximum strength and productivity. Some pruning will be necessary each year to

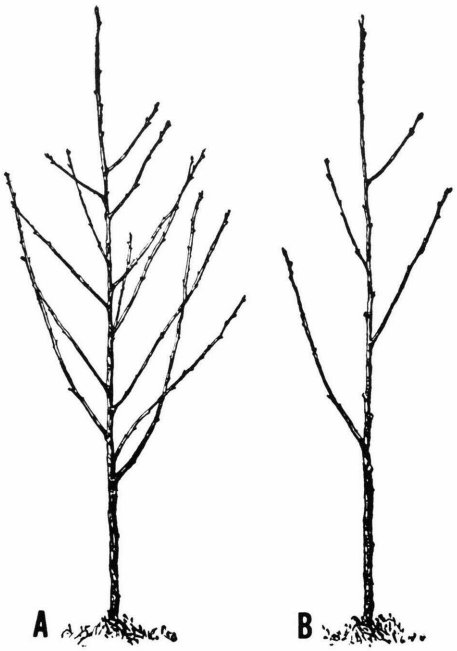

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Figure 13.—One-year-old Montmorency cherry trees, about 3 feet high, showing method of pruning at time of planting: A, Before pruning; B, after pruning.

maintain a balance between the scaffold limbs. If some are allowed to develop more rapidly than others, the leader and the weaker scaffold branches will be choked out (fig. 14). More pruning than necessary, however, will delay bearing and dwarf the tree.

When sour-cherry trees reach mature bearing age, they require little pruning except some thinning out of weak branches, especially on the inside of the trees (fig. 15). If this is not done, they become bushy (fig. 16) and hard to spray, and they bear many small, unevenly ripening fruits (fig. 17). It is best to head back trees that become too tall. This can be done by heading back the branches.

Moderately light pruning accompanied by adequate nitrogen fertilization will help maintain good terminal growth and vigorous spurs.

Sweet-Cherry Trees

A 1-year-old sweet-cherry tree has few or no lateral branches when received from the nursery. If a tree 4 to 5 feet high is used, many growers prefer not to cut back the leader for at least 2 years.

After the first season's growth, select branches with wide angles at their bases and spaced 8 to 10 inches above one another. Well-selected branches will be stronger and more resistant to winter injury than poorly formed ones. Only the largest and most vigorous ones should be cut back at all, and they should be cut very little.

Between the ages of 2 and 7 years, when sweet-cherry trees usually come into bearing, pruning should be very light. The tree is pruned only enough to help balance the scafford limbs and direct the leader to an outside branch if the leader becomes extremely vigorous.

Dead or broken limbs are removed, and weak ones thinned out (fig. 18). When they become too high for convenience in spraying and picking, the most upright limbs may be cut back, or top hedged.

PICKING AND PACKING THE FRUIT

Picking

Cherries are picked with or without their stems, depending on the disposition to be made of them. When they are to be sold on the local fresh-fruit market or shipped to a distant market, the stems should be left on; if they are separated from the stems, juice may ooze from the fruit and cause decay. Sweet varieties, and the sweet-sour hybrids (Dukes), usually are harvested with stems attached. After some experience, pickers can pick cherries with stems attached with little damage to the fruits or spurs on the trees.

When cherries are harvested to be processed for canning or freezing, they are picked without stems. For many years they have been harvested by hand, into pails that usually are tied to the picker's body so he can pick with both hands. The fruit is emptied from the pails into lugs, and hauled to the processing plant.

The annual harvesting of sour or red tart cherries by hand has been tedious and expensive. Also, the seasonal labor supply is often uncertain, and workers require close supervision.

Most sour (tart) cherries commercially grown in the United States today are harvested mechanically. This may be done with machines owned by the grower or on a custom basis.

The system required consists of the harvesters which are of two general types, trunk shakers or limb shakers, with most of the industry presently utilizing the trunk shaking apparatus. The second part of the machinery is the catching apparatus which may be either rollout canvas type with con-

veyor, or inclined frame, or in some cases, half and half, one side being inclined frame, the other rollout. Other equipment required are conveyors, elevator, hauling tanks, forklifts and cooling pads with ample supply of cold water and a place to dispose of it.

Fruit is "shaken" from the tree on to the catching apparatus whereupon it is moved to a conveyor carrying it to an elevator which deposits the fruit

PN-2958

Figure 14.—Three-year-old Montmorency cherry tree with weak crotch that resulted from allowing the scaffold branches to crowd out the leader.

in the hauling tanks two-thirds full of cold water. Once the tank is filled with fruit (approximately 1000 pounds), it is moved by forklift tractor to the cooling pad where cold water is flushed through the fruit, a minimum of 4 hours to cool it to internal temperature of less than 55° F. After adequate cooling which also firms the fruit, it is transported in the hauling tanks to nearby processing plants where it is then de-stemmed mechanically, electronically sorted, pitted, and preserved either by can-

PN-2959

Figure 15.—Vigorous Montmorency cherry trees, about 7 years old. It received little pruning after selection of scaffold branches. When the tree was photographed, little was needed except a little thinning out of weak limbs in the center. Note the strong, well-shaped scaffold branches.

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Figure 16.—Twelve-year-old Montmorency cherry tree that had received no pruning for 5 years and very little pruning before that. When photographed, it was too bushy for uniform ripening of high-quality cherries, for thorough spraying, or for easy harvesting of the fruit. All that is needed, however, was some thinning of weak limbs in the center. Note the strong, well-spaced scaffold branches.

ning or freezing. Dumping the fruit at the plant from the tanks to begin the process is accomplished with the use of lifts with roll-over forks.

In the case of mechanically harvested sweet cherries, the same equipment is utilized excepting sweets for canning that are carried from the harvester in dry pallet boxes (approximately 500 pounds). If they are to be used for brining, the fruit is either hauled dry in boxes to a brine plant or SO_2 brine is mixed in the hauling tanks and they are actually brined in the orchard either on the harvester or at a central location.

Packing

A number of methods are used to pack cherries for the fresh fruit market. Sweet cherries are often sold for fresh consumption, and are very popular in some markets.

In some orchards, fruit is packed directly in baskets of various sizes. Sometimes the picking pails are emptied onto a sorting table or conveyor from which the cherries are transferred to 1-quart boxes; these are packed into 16- or 24-quart crates or 8-quart flats for marketing.

Also used are the western lug,

holding 15 to 20 pounds, and the 4-quart climax basket.

For highest quality and least spoilage, cherries for fresh consumption must be handled with stems attached and must be kept cool.

DESCRIPTION OF VARIETIES

The number of important cherry varieties grown in Eastern United States are relatively few. Only those most commonly grown are described here.

Montmorency is by far the leading sour variety. Several strains of this variety have been selected and some appear promising, especially to lengthen the season. Montmorency is self-fruitful and does not need to have another variety interplanted with it.

After Montmorency, the next most important sour varieties are English Morello and Early Richmond; they also set good crops without cross-pollination with other varieties.

The Duke cherries are hybrids of sour and sweet cherries, and have some of the characteristics of each. The Dukes vary considerably in their pollination requirements. The early-flowering Dukes, such as Brassington and Reine Hortense, should be interplanted with sweet cherries and the late-flowering ones, such as Royal Duke, with sour varieties.

Sweet-cherry varieties are often separated into two groups—the heart, or soft-fleshed, type, such as Seneca or Governor Wood, and the Bigarreau, or firm-fleshed type, such as Windsor or Napoleon. The leading sweet varieties in Eastern States are Windsor, Schmidt, and Napoleon; Seneca and Black Tartarian are sometimes desirable because of their earliness.

Most sweet varieties are self-unfruitful. It is therefore necessary to plant different varieties near enough to each other to insure transfer of pollen from one variety to another. Also, three common varieties, Bing, Lambert, and Napoleon, will not pollinate each other; some other variety such as Windsor or Van, must be planted with them.

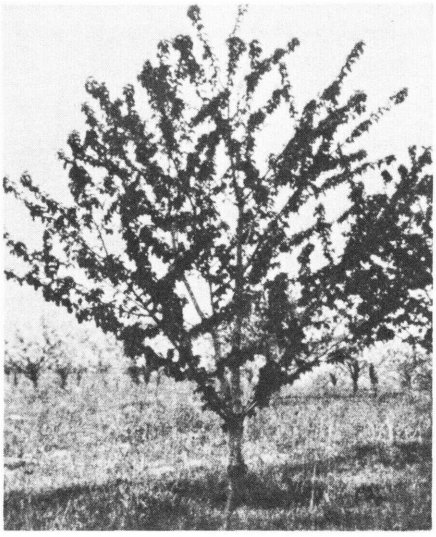

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Figure 17.—Seven-year-old sweet-cherry tree that received little pruning after being planted. Too many of the lower branches originate at the same height; otherwise the tree is rather well shaped and requires little pruning.

Sour Varieties

The principal sour-cherry varieties are described in order of their ripening as follows:

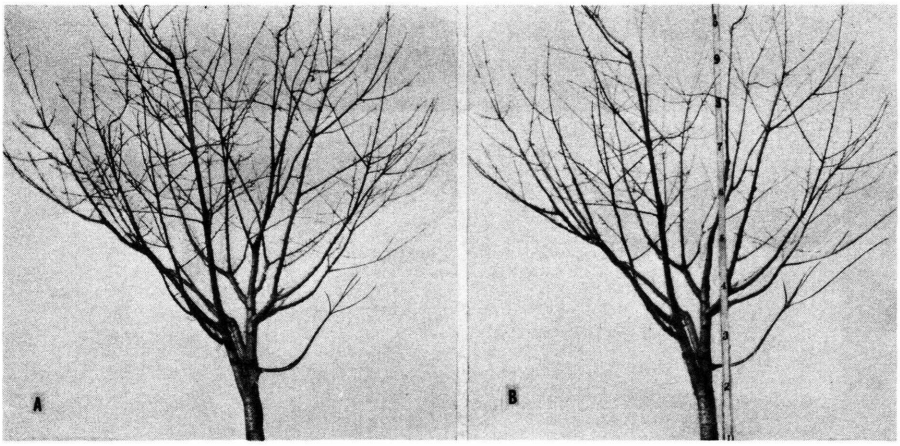

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Figure 18.—A six-year-old sweet-cherry tree that never has been pruned except for selection of scaffold branches. Note the well-shaped, wide-angled scaffold branches and the modified leader. B, Same tree after a light-thinning-out pruning.

Early Richmond.—Early, ripening 7 to 10 days before Montmorency. Fruits red, small to medium sized, of only fair quality at best. Value doubtful; suggested only because of early ripening; trend is away from it toward early strains of Montmorency.

Shook Cherry.—Early Morello type cherry ripening 10-14 days ahead of Montmorency. Fruits are deep red skin with colored juice, medium size, high quality. Difficult to pollinate, must be planted near Sweet cherry.

Mortmorency.—Midseason. Fruits bright red, large, of high quality. Trees vigorous and high yielding on good soil. By far the leading sour-cherry variety; the only one grown by many of the most successful growers.

English Morello.—Late, ripening 10 days to 2 weeks after Montmorency. Fruits almost black when fully ripe, medium sized; juice high in sugar, but so high in acid that a sour flavor results. Trees spreading, small (therefore sometimes used in home-garden plantings). Most commonly grown of Morello type, but this type not recommended for general planting because of low yield, limited demand for the fruit, and susceptibility to leaf spot.

Duke Varieties

Duke cherries (fig. 19) should be grown only on a small scale unless there is a known demand for fruit of this type. They are neither sweet nor sour, but a blend of both. Most people find them too sour for eating fresh, but many prefer them for canning, freezing, and pie making. The following varieties, listed in the order of their ripening dates, are suggested.

Brassington.—Ripening during sweet-cherry season or soon after. Fruits red, medium sized; quality more like that of sweet cherries than that of sour cherries. Trees often lacking in vigor, breaking easily, and

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Figure 19.—Duke cherry trees, 8 years old. Because of the very upright habit of growth and the heavy foliage, individual branches are not visible.

low yielding. Preferred by many for pie making.

Reine Hortense.—Midseason. Fruits light red, large, sweeter than those of Brassington, soft fleshed, juicy, of poor keeping quality. Trees more vigorous and productive than those of Brassington, but also breaking easily. Duke variety should be used most often.

Royal Duke.—Latest of Duke varieties listed. Fruits dark red, medium sized to large, slightly sweeter than the sour types, attractive. Trees often vigorous, high yielding, resembling the sour varieties, breaking fairly easily. Preferred by some for pie making and eating fresh.

Sweet Varieties

Sweet-cherry varieties are not as dependable as sour ones in most sections. They are more subject to difficulty in establishing the trees; are subject to frost damage, cracking of fruit, brown rot, loss of fruit from birds damage, and require cross pollination.

The preferable sweet varieties in the Eastern States are Windsor, Schmidt, and Napoleon. Seneca is sometimes planted for a very early variety; Black Tartarian and Victor are planted to ripen slightly later but before the main season. Yellow Spanish is one of the varieties most hardy under low winter temperatures.

Trees of Schmidt, Black Tartarian, and Napoleon are upright growing and those of Seneca and Windsor are more spreading. Black Tartarian and Seneca are very susceptible to brown rot.

The varieties are listed here in the approximate order of their ripening.

Seneca.—Very early. Fruits red, medium sized, of good quality, soft fleshed, juicy. Often used where very early variety is desired but frequently fruits are largely destroyed by birds.

Black Tartarian.—Early. Fruits purplish black, small to medium sized, of good quality, soft fleshed, juicy. Used principally to lengthen season in home plantings and for local sales.

Victor.—Early. Fruits light colored with pink blush, medium sized to large, firm fleshed. Trees strong and productive.

Van.—Late. Fruits dark red, firm fleshed, of high quality. Trees strong and productive; a variety worth testing, especially for hardiness. Short stemmed.

Bing.—Midseason. Fruits very dark red to black, large, of high quality, firm fleshed; very attractive when fully ripe, but often cracking open and rotting before fully ripe. Less satisfactory in the East than in the West because of susceptibility to winter injury, cracking, brown rot, and infection of the fruit. Trees usually are only fairly vigorous and productive in the East.

Napoleon (Royal Ann).—Midseason. Fruits light yellow, have pink blush, large, of high quality, firm fleshed, subject to less extensive cracking and rotting than Bing during moist seasons. Trees virogous, productive, and fairly tolerant of low winter temperatures. Most commonly grown light-colored sweet cherry.

Yellow Spanish.—Midseason. Fruits yellow, have pink blush and attractive ground color, smaller than those of Napoleon, of good quality, firm fleshed. One of the most winter-hardy sweet cherries.

Emperor Francis.—Midseason. Fruits yellow background with red blush which may almost completely cover the fruit when mature. Larger and more round fruit than Napoleon. Very winter hardy. Matures 10 days after Napoleon. Excellent for brining.

Vega.—Early light for brining, large size, 10 to 14 days ahead of Napoleon, yellow background with red blush.

Gold.—Latest maturing light sweet, small size ideal as a dipping cherry, fully yellow skin, no blush - matures 10 to 14 days after Napoleon.

Hedelfingen.—Late maturing dark sweet for canning and fresh market, long stem, purplish to black skin with very dark juice at at maturity. Heavy yielder, small size if crop is too heavy, winter hardy.

Windsor.—Medium late. Fruits dark changing to black when ripe, medium sized, firm fleshed; smaller and less attractive, but less subject to cracking and rotting than fruits of Bing, or Schmidt, therefore, sometimes more profitable. Trees spreading, vigorous productive, and fairly hardy. One of the best varieties for cropping.

Schmidt.—Medium late. Fruits dark red to almost black when ripe,

large, of high quality, firm fleshed, very attractive although sometimes injured by cracking but less so than Bing or Lambert. Trees very vigorous, but relatively late in coming to full bearing.

DISEASES

Virus Diseases

Several virus diseases affect cherries in north-central and northeastern parts of the United States.

Ring Spot

The virus disease that most commonly attacks cherry trees is known as ring spot. On sour-cherry trees, symptoms are visible only for 1 to 2 years after the initial infection by this disease. After this, infected trees are virus carriers that show no symptoms of the disease other than varying degrees of retarded growth. During the first stages of infection, the trees become retarded in foliation and thin in appearance. Many leaves have indistinct rings of dead tissue, and some leaves become "shotholed" and tattered.

On Sweet-cherry trees, ring spot causes discolored and dead ring and shotholed patterns on the leaves, which may become tattered. Symptoms are more severe during the initial stages of the disease; usually they recur annually, and are more pronounced on leaves formed early in the season.

Yellows

The disease known as yellows is causing increasing damage to sour-cherries; about one-third of all trees in old orchards are affected. The first symptom is a green and yellow mottling of older leaves. This is followed by periodic waves of partial defoliation, starting 3 to 4 weeks after petal fall.

When trees have been affected by yellows for several years they develop abnormally large leaves and few spurs; they bear small crops of large-sized fruit. Eventually, affected trees become thin, fail to make normal growth, and become marginal producers. Symptoms are most pronounced in the better producing areas that have cool climates, such as those bordering the Great Lakes; symptoms may not even be apparent in warmer areas of the midwest.

Certified yellows-free nursery stock is available from many nurseries; the grower should make sure he obtains such stock to start his orchard. Also, he should not start a new orchard adjacent to an old one.

X-disease

X-disease affects both sweet- and sour-cherry trees. Affected trees have sparse foliage, are light green, and fail to mature their fruits. At normal maturity time, fruits remain small; sour cherries remain pink, and sweet cherries become light red instead of dark.

X-disease virus spreads from diseased chokecherries to other fruit trees. It can be controlled by removing the diseased orchard trees and, at the same time, by removing chokecherries from the vicinity of the orchard.

Several other virus diseases occa-

sionally affect cherries in Eastern States, but as yet are not considered serious.

Fungus Diseases

The most important fungus diseases of cherry are leaf spot[2] of the foliage and brown rot[3] of the fruit.

Leaf Spot

Leaf spot (fig. 20) is caused by a fungus that overwinters on fallen leaves. In spring, spores are discharged from these leaves and carried by the wind to the new leaves on which they germinate and cause infection. Small spots, purplish at first but finally brown, develop on the leaves and produce enormous numbers of summer spores; these spread infection to adjacent leaves and trees.

If not controlled, leaf spot will cause partial to complete defoliation. In mild cases, only a small number of leaves may be spotted, but frequently during periods of damp or rainy weather the spots become so numerous that the tree is completely defoliated before the crop is harvested.

Control of leaf spot on sour cherries requires at least five spray applications: (1) As soon as the petals have fallen, (2) when about three-fourths of the shucks have dropped, (3) about 10 days after the second spray, (4) 10 days to 2 weeks after the third spray, (5) immediately after harvest.

Fungicides.—Growers should consult their State agricultural colleges or county agricultural agents for information regarding the fungicides best suited to their localities.

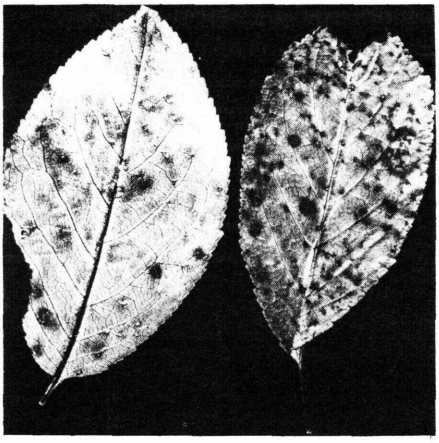

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Figure 20.—Sour-cherry leaves affected with leaf spot.

Various sulfur or copper compounds have been used for many years to control cherry leaf spot. The sulfurs include liquid lime-sulfur, wettable sulfur; the coppers include bordeaux, copper oxychloride, and tribasic copper sulfate.

These chemicals usually give satisfactory results, but occasionally they cause damage. Liquid lime-sulfur may discolor the fruit, and bordeaux may reduce the size of the cherries. Where such damage is likely to result, the less caustic forms of sulfur, and milder fixed copper (copper oxychloride or tribasic copper sulfate) may be used to hold the disease in check.

To spray sour cherries except the English Morello and Wragg varieties, lime-sulfur may be used, mixed at the rate of 1 to 2 gallons in each 100 gallons of water. Or bordeaux mixture

[2]Caused by *Coccomyces hiemalis* Higgins.

[3]Caused by *Monilinia fructicola* Honey and M. *laxa* Honey.

may be used, mixed at the rate of 2 to 4 pounds of copper sulfate plus 4 to 8 pounds of hydrated lime in each 100 gallons of water. A third selection is the fixed copper, mixed at the rate of 3 pounds of material having 25 percent metallic copper content plus 3 pounds of hydrated lime in each 100 gallons of water.

Sweet cherries and the English Morello and Wragg varieties of sour cherries are sensitive to copper, and never should be treated with a copper compound. Lime-sulfur may be used, mixed at the rate of 1 gallon in every 100 gallons of water; it may be used in all five applications, but less injury will result if lime-sulfur is used in the first application and wettable or flotation sulfur (6 pounds in each 100 gallons of water) is used in the other four applications.

In recent years, the organic fungicides (captan, dodine, ferbam, benomyl, captofol, and glyodin) have given outstandingly better results than the older type sprays of sulfur or copper. Therefore, much acreage is now sprayed with these materials. Formulations vary in different parts of the country. The quantities usually recommended for mixing in 100 gallons of water are: 1 1/2 pints to 2 pints of glyodin; 6 to 8 ounces benomyl; 1 to 2 pints of difolatan; or, 2 1/2 ounces of dodine; or, 2 pounds of captan; or 18 1/4 to 24 ounces of ferbam.

Brown rot

A widespread and destructive fruit rot of peaches and plums is called brown rot; it frequently causes heavy losses to cherry growers during seasons when the skin of the fruit has been cracked by excessive rain or hail.

The first four spray applications made for control of leaf spot usually control the brown rot fungus. Blossom spray is especially important. If the orchard has had previous outbreaks of brown rot, an additional spray application should be made just as the fruit begins to color. In this preharvest application, many growers prefer to use captan or wettable sulfur instead of either lime-sulfur or bordeaux mixture.

Other fungus diseases, such as black-knot,[4] powdery mildew,[5] leaf rust,[6] and scab,[7] occur to some extent on cherry. These diseases are usually less serious than either leaf spot or brown rot. Most of them are held in check by the applications of spray used to control leaf spot and brown rot.

INSECTS

The insect pests most commonly found on cherry trees are the black cherry aphid,[8] the plum curculio,[9] two kinds of fruit flies,[10] the Mineola moth,[11] the lesser peach tree borer,[12] the American plum borer,[13] and the pear slug.[14]

[4]Caused by *Dibotryon morbosum.*

[5]Caused by *Podosphaera oxyacanthae.*

[6]Caused by *Tranzschelia prunispinosae.*

[7]Caused by *Cladosporium carpophilum.*

[8]*Myzus cerasi.*

[9]*Conotrachelus nenuphar.*

[10]*Rhagoletis cingulata* and *R. fausta.*

[11]*Mineola scituella* Hulsta.

[12]*Synanthedon pictipes.*

[13]*Euzophera semifuneralis.*

[14]*Caliroa cerasi.*

Black Cherry Aphid

The black cherry aphid is a tiny, black, shiny insect that curls the tender young foliage of the sweet cherry early in the season (fig. 21). Often, it severely checks growth. It rarely injures the sour cherry seriously.

The insects pass the winter as tiny, black eggs on twigs and small branches. These eggs hatch in spring about the time tree growth starts, and the young aphids cluster on opening buds.

Spray when aphids appear during spring and summer. Use malathion, endosulfan, parathion, or diazinon, diluted according to directions on the container label. (See "Precautions," p.29 .)

Plum Curculio

The plum curculio is a small beetle that hibernates in trash in the orchard or near it. Early in spring, soon after the cherry trees bloom, the curculios move to the trees. Females insert their eggs just beneath the skin of the cherries; then they make crescent-shaped slits, each of which partly surrounds an egg puncture. The curculio larvae, or grubs, feed within the cherries for several weeks.

The plum curculio can be controlled also with two or three applications of parathion, EPN, azinphosmethyl, or methoxychlor, diluted and used in accordance with recommendations on the container label. (See "Precautions," p. 29 .) Applications should be made at 8- to 10-day intervals, beginning at petal fall or shuck split. Do not apply azinphosmethyl more than 8 times per season.

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Figure 21.—Cherry leaves curled by the cherry aphid.

Fruit Flies

In the Northern States, cherries are sometimes infested by maggots of two species of fruit flies: The white bodied and black bodied cherry fruit

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Do not use azinphosmethyl or parathion in lone plantings; they should be applied only by a trained operator.

Trade names and the names of commercial companies are used in this publication solely to provide specific information. Mention of a trade name or manufacturer does not constitute a guarantee of warranty of the product by the U.S. Department of Agriculture nor an endorsement by the Department over other products not mentioned.

The user is responsible for the proper use and storage of pesticides. Pesticides used improperly can be injurious to man, animals, and plants. Store pesticides in original containers under lock and key—out of the reach of children and animals—and away from food and feed, seed, other plant materials, and fertilizer. Follow the directions and heed all precautions on labels.

flies. The white bodied specie is generally most injurious.

Control.—The adult insects can be killed before they lay their eggs by spraying with imidan, azinphosmethyl, parathion, methoxychlor, or diazinon. Malathion ultra low volume spray may also be used, but only in the Northwest, and must be applied by air. Recommendations for diluting these materials and cautions in handling them are given on container labels and should be followed closely. The first application should be made early in June, and the spraying should be repeated 2 to 4 times at 7- to 10-day intervals.

Mineola Moth

This insect overwinters as a larvae up in the tree. It becomes active in early spring and if present can cause serious injury to opening fruit buds. The insect then pupates and emerges as an adult moth in June. Eggs are laid and the larvae from the hatch attack the cherry.

Control.—Parathion and azinphosmethyl are the most common control insecticides.

Borers

Lesser peach tree borer and American plum borer attack trunk and lower limbs of cherry trees and repeated injury can eventually result in tree death from girdling.

Control.—The lesser peach tree borer can be effectively controlled with endosulfan. Treatment, technique, and timing to control the American plum borer is still under research.

Pear Slug

The pear slug, also called the cherry slug, is a slimy, dark-colored worm that feeds on cherry leaves. The slugs appear on the trees in May or June, according to the locality; a second brood may appear in midsummer or late summer.

Control.—This pest is readily controlled by spraying the trees with parathion, as indicated for the plum curculio.

USE OF PESTICIDES

This publication is intended for nationwide distribution. Pesticides are registered by the Environmental Protection Agency (EPA) for countrywide use unless otherwise indicated on the label.

The use of pesticides is governed by the provisions of the Federal Insecticide, Fungicide, and Rodenticide Act, as amended. This Act is administered by EPA. According to the provisions of the Act "It shall be

unlawful for any person to use any registered pesticide in a manner inconsistent with its labeling." (Section 12(a) (2) G))

EPA has interpreted this Section of the Act to require that the intended use of the pesticide must be on the label of the pesticide being used or covered by a Pesticide Enforcement Policy Statement (PEPS) issued by EPA.

The optimum use of pesticides, both as to rate and frequency, may vary in different sections of the country. Users of this publication may also wish to consult their Cooperative Extension Service, State Agricultural Experiment Stations, or County Extension Agents for information applicable to their localities.

The pesticides mentioned in this publication are available in several different formulations that contain varying amounts of active ingredient. Because of this difference in active ingredient the rates given in this publication refer to the amount of active ingredient, unless otherwise indicated in the publication. Users are reminded to convert the rate in the publication to the strength of the pesticide actually being used. For example, 1 pound of active ingredient equals 2 pounds of a 50% formulation.

The user is cautioned to read and follow all directions and precautions given on the label of the pesticide formulation being used.

Federal and State regulations require registration numbers on all pesticide containers. Use only pesticides that carry one of these registration numbers.

USDA publications that contain suggestions for the use of pesticides are normally revised at 2 year intervals. If your copy is more than 2 years old, contact your Cooperative Extension Service to determine the latest pesticide recommendations.

The pesticides mentioned in this publication were Federally registered for the use indicated as of the issue of this publication. The user is cautioned to determine the directions on the label or labeling prior to use of the pesticide.

PRECAUTIONS

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key—out of the reach of children and animals—and away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treat-

ment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you use for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary land-fill dump, or crush and bury them in a level, isolated place.

Note: Some States have restrictions on the use of certain pesticides. Check your State and local regulations. Also, because registrations of pesticides are under constant review by the U.S. Environmental Protection Agency, consult your county agricultural agent or State Extension specialist to be sure the intended use is still registered.

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Post the telephone number, location and address for your area Poison Control Center in conspicuous places for all employees to see.

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